Claims:

1. A process for the oxidation of a C_2 to C_4 alkane to produce the corresponding alkene and carboxylic acid and/or for the oxidation of a C_2 to C_4 alkene to produce the corresponding carboxylic acid, which process comprises feeding to an oxidation reaction zone said alkane and/or alkene, a molecular oxygen-containing gas, carbon monoxide, and optionally water, in the presence of a catalyst active for the oxidation of the alkane to the corresponding alkene and carboxylic acid and/or active for the oxidation of the alkene to the corresponding carboxylic acid, to produce a first product stream comprising alkene and carboxylic acid, characterised in that said carbon monoxide is maintained at between 1% and 20% by volume of the total feed to the oxidation reaction zone.

2. A process according to claim 1 which further comprises contacting in a second reaction zone at least a portion of said alkene and at least a portion of said carboxylic acid obtained from the oxidation reaction zone, and a molecular oxygen-containing gas, in the presence of at least one catalyst active for the production of alkenyl carboxylate to produce a second product stream comprising alkenyl carboxylate.

3. A process according to claim 1 which further comprises contacting in a second reaction zone at least a portion of said alkene, at least a portion of said carboxylic acid obtained from the oxidation reaction zone and, optionally, water, in the presence of at least one catalyst active for the production of alkyl carboxylate to produce a second product stream comprising alkyl carboxylate.

4. A process according to any one of the preceding claims wherein the carbon monoxide is fed to the oxidation reaction zone as a fresh gas and/or as a recycle gas.

5. A process according to any one of the preceding claims wherein the first product stream comprises carbon monoxide.

6. A process according to claim 5 wherein at least 90% of the carbon monoxide present in the first product stream is recycled to the oxidation reaction zone.

7. A process according to any one of claims 2 and claims 4 to 6 wherein the second product stream comprises carbon monoxide.

8. A process according to claim 7 wherein carbon monoxide is separated from the second product stream and recycled to the oxidation reaction zone.

9. A process according to any one of the preceding claims wherein the amount of carbon monoxide in the feed (as fresh and/or recycle gas) is maintained above 2.5% by volume of the total feed.

10. A process according to claim 9 wherein the amount of carbon monoxide is maintained above 5% by volume of the total feed.

11. A process according to claim 9 wherein the amount of carbon monoxide is maintained in the range above 5% by volume to 20% by volume of the total feed.

12. A process according to claim 9 wherein the amount of carbon monoxide is maintained in the range above 5% by volume to 15% by volume of the total feed.

13. A process according to any one of the preceding claims wherein the amount of carbon monoxide in the feed (as fresh and/or recycle gas) is maintained below 15% by volume of the total feed.

14. A process according to claim 13 wherein the amount of carbon monoxide is maintained in the range above 5% by volume to below 15% by volume of the total feed.

15. A process according to claim 13 wherein the amount of carbon monoxide is maintained in the range above 5% by volume to 10% by volume of the total feed.

16. A process according to any one of the preceding claims wherein the C_2-C_4 alkane is ethane, the C_2 to C_4 alkene is ethylene and the carboxylic acid is acetic acid.

17. A process according to any one of the preceding claims wherein ethane and ethylene are fed to the oxidation reaction zone.

18. A process according to any one of the preceding claims wherein each of the alkane and alkene is fed to the oxidation reaction zone as fresh feed and/or as a recycle component.

19. A process according to any one of the preceding claims wherein the

concentration of alkane (as fresh feed and recycle component) is from 0 to 90 mol% of the total feed to the oxidation reaction zone.

20. A process according to any one of the preceding claims wherein the concentration of alkene (as fresh feed and recycle component) is from 0 to 50 mol% of the total feed to the oxidation reaction zone.

21. A process according to any one of the preceding claims in which water is fed to the oxidation zone as fresh feed and/or recycle component in a concentration in the range greater than 0 to 50 mol% of the total feed.

22. A process according to any one of the preceding claims wherein the mol ratio of alkene to carboxylic acid in the first product stream is approximately 1 : 1.

23. A process according to claim 2 wherein the alkenyl carboxylate is vinyl acetate

24. A process according to any one of claims 2 to 23 wherein additional alkene and/or additional carboxylic acid is fed to the second reaction zone.

25. A process according to anyone of claims 2 and 4 to 24 wherein the concentration of alkene fed to the oxidation reaction zone is less than 20 mol% of the total feed and/or the concentration of alkene fed to the second reaction zone is greater than 50 mol% of the total feed.

26. A process according to any one of claims 2 and 4 to 25 wherein the concentration of alkene fed to the second reaction zone is at least 60 mol% of the total feed.

27. A process according to claim 25 or claim 26 wherein the alkene is ethylene.

28. A process according to any one of claims 2 and 4 to 27 wherein the second reaction zone is a fixed bed or a fluidised bed reactor.

29. A process according to claim 3 wherein the alkyl carboxylate is ethyl acetate.

30. A process according to claim 3 or claim 29 wherein water is fed to the second reaction zone in an amount in the range 1 to 10 mol% of the total feed.

31. A process according to any one of the preceding claims wherein the oxidation reaction is carried out at a temperature in the range 100 to 400° C.

32. A process according to any one of the preceding claims wherein the total amount of inert impurities present in the alkene and/or alkane feed to the oxidation reactor is in the range 0 to 3 vol%.

33. A process according to any one of the preceding claims wherein the total amount

of reactive impurities present in the alkene and/or alkane feed to the oxidation reactor is in the range 0 to 10 vol%.